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2 VLMs save 70% Floor Space & Provide 90% Faster Picking While Keeping Employees Out Of Harms Way.

Welcome

Maximizing space, gaining efficiency

In light of the growth of e-commerce—and the fact that consumers and businesses are buying again—many of the discussions that we had at ProMat 2015 didn't revolve around the products and the equipment on display as much as it did the supplemental technology and solutions that are designed to optimize systems in an effort to work "smarter."

With goods moving off the shelves at such a breakneck pace, warehouse and distribution center (DC) managers are now under more pressure than ever to carve out space and optimize throughput in the face of a stronger digital economy. In most cases, the goal is to maximize storage capacity and labor productivity within the same footprint—and do it without breaking the bank.

In this custom edition, the editorial staff of Modern Materials Handling has collected stories designed to help warehouse and DC managers gain a better understanding of how to meet the pressing e-commerce and subsequent omni-channel fulfillment challenge by putting solutions to work that will maximize the space you have and bring labor efficiency to a whole new level.

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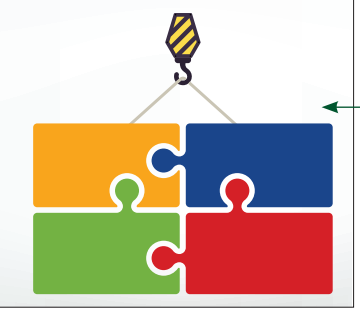


Smarter Materials Handling: Moving from products to *solutions*

To gain more capacity, companies can either build or lease more warehouse space—but that entails significant capital expenditure. A more feasible option is to maximize existing space through a complete storage and retrieval solution that can quickly adapt to changes in order mix or volumes. Here's how it's done.

By **Roberto Michel**, Contributing Editor

In the distribution industry, being busy is a good thing. It means consumers and business customers are buying, and goods are moving off the shelf.

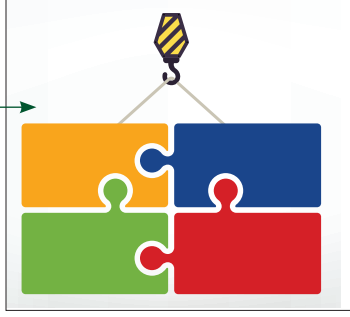
But it can also put a crimp on space in warehouses and distribution centers (DCs) and send managers searching for ways to gain room without building new facilities. At the same time, the growth of e-commerce increases item-level picking, which makes it tougher to keep up with throughput and accuracy requirements using manual picking methods.

Drivers such as the pressing need to carve out more space and optimize throughput in the face of a stronger, digital economy is reflected in the healthy growth curve for material handling systems and equipment. According to a MHI forecast, material handling equipment new orders grew 8.1 percent in 2014 and are expected to grow 9 percent for 2015.

Meanwhile, Peerless Research Group's (PRG) 2015 State of Warehouse/DC Equipment Survey found an increase in number of respondents ready to proceed with system investments, with the percentage of hesitant buyers dropping from 43 percent to 35 percent.

Clearly, there is a need to boost storage capacity and labor productivity to keep up with economic growth. Not only does the National Retail Federation expect retail sales to grow at a 4.1 percent clip in 2015, growth for e-commerce is seen by many analysts at better than double that pace, which has many supply chains changing their warehouse operations to support multi-channel fulfillment.

These trends often add up to a scramble to find more space, say providers of automated materials handling systems. "Many customers are initially contacting us because they're running out of space, either to handle more goods in a warehouse environment, or if they are manufacturer, so they can allocate more floor space to production capacity," says Mike Ward, sales consultant with V&H Material Handling. "People are trying to optimize what they can do within the walls of their existing



facilities without having to expand them or open up additional facilities."

To gain more capacity, companies can either build or lease more warehouse space, but that entails significant capital expenditure. A more feasible option for many companies is to maximize existing warehouse space by doing a better job of utilizing overhead vertical space.

To make the most of the "cubic" potential of existing facilities, companies have various options, from going higher with static rack systems to deploying automated storage and retrieval systems (AS/RS), installing mezzanines, or a combination of options. Within the AS/RS category itself, there's a variety of system types, from higher end mini-load AS/RS, to vertical lift modules (VLMs) and horizontal and vertical carousels.

While each facility will differ in terms of what type of equipment and systems make sense for its operations, and a combination of systems may be needed, VLMs and carousels are proven, relatively lower cost ways to maximize storage and help productivity. They support a "goods to person" process in which items are delivered on trays or carriers to a pick position or window, and are managed by software to support efficient batch picking methods.

So is the answer to today's needs as simple as running out and acquiring a VLM or carousel? While the systems themselves need to be understood, potential users of dynamic storage and retrieval systems need to look beyond product features and consider what it takes to establish an effective solution.

Kardex Remstar, a manufacturer and provider of dynamic storage and retrieval systems, works with a network of dealers in the U.S. market to deliver solutions across multiple markets, including distribution, manufacturing, healthcare, automotive, government, and many others.

These channel partners know better than anyone what is involved in choosing, deploying, and supporting a storage and retrieval solution, including adapting systems to changes in order mix or volumes. To gain a closer understanding of what's involved in putting together a solution, these partners shared their insights on a smarter approach to materials handling solutions.

Gain space and more

According to a report from data company CoStar, as of the end of 2014, the industrial real estate market has seen the vacancy rate fall for 19 consecutive quarters, ending 2014 at 7.2 percent to reach a nearly 14-year low.

This has sent rental rates upwards, but companies have been reluctant to go on a building binge, with construction lagging behind the high levels seen in the mid-2000s. In short, companies are taking a cautious approach to adding space, which means operators of DCs, store rooms and parts storage areas must take a hard look at ways to gain more useable space at existing sites.

Mike Rodriguez, senior sales engineer with Alternative Handling Technologies, (AHT) agrees that space constraints are a major pain point, especially with many companies reconfiguring or merging warehouses to cope with multi-channel pressures. "Companies are trying to do more with what they have, so using the vertical space in their facilities becomes more important than ever," he says.

"The software is going to maximize the throughput of orders through the equipment, and it can also drive multiple units at the same time, which is going to really reduce operator dwell time and pick time."

—Doug Card, Kardex Remstar's director of systems and special applications

Dynamic storage and retrieval systems are much more space efficient than static shelving because they have sensing and software intelligence to store inventory in the most efficient open location. In the case of VLMs, a light beam at the back of the access opening scans the height of each tray as it's stored and automatically adjusts on the fly (or "dynamically") the storage location based on the height of the tallest item in the tray.

With static shelving, by contrast, a shelf can't be moved without disassembly, so it cannot adjust on the fly to create dense vertical storage. Additionally, with shelving, inventory typically needs to be assigned to fixed locations for each stock keeping unit (SKU). That means even if there's zero inventory for a SKU, there's a spot left open for it.

The result is that static rack and shelving systems often waste vast amounts of space. Compared with static shelving, a dynamic storage and retrieval solution typically can reduce amount of floor space required by between 75 percent and 90 percent.

"When we walk up and down the aisles of a warehouse or store room with a client and see an 18-inch deep shelf, and only one item at the front it facing an aisle, the space benefits of dynamic storage and retrieval become pretty obvious," says Ward. "In a typical shelving analysis, only between 25 percent and 45 percent of the

storage capacity is being used."

Further, integrating Kardex Remstar hardware solutions with Power Pick Global inventory management software can offer an even smarter approach to storage. The software has user configurable rules that support picking methods such as first-in/first out (FIFO) picking, picking by expiration date, by priority codes, or by lot or serial numbers.

According to these rules, the software can select the most efficient spot within the system to store goods and can support batch picking to minimize the time needed to pick multiple orders, thus improving throughput and minimizing labor requirements.

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"No doubt that space savings is a big driver for customers today, but so is productivity," says Brian Rodway, systems sales manager with Johnston Equipment. "Once we get in and talk with customers and examine their processes and the areas they want to improve, there are usually multiple benefits that we can identify above and beyond space savings, like pick and inventory accuracy, FIFO management of parts, or batch/lot control. And with 'each' picks becoming more prevalent because of online commerce, the need to be both very productive and highly accurate is stronger than ever, so many of our customers are implementing our systems in response to these demands."

Kardex Remstar's partners have the expertise in material flow, inventory management software, integration with host systems, and batch picking methodologies to ensure clients get maximum benefits from dynamic storage and retrieval equipment. These partners can assess the needs of a user company's order mix, layout, material flow, host system integration, and help establish the best picking methods. When combined with training and support services, it amounts to a complete, smarter solution approach.

Assess and configure

The first step in coming up with an effective solution is to analyze the current operation and assess application needs.

For example, says Rich O'Connor, director of systems and automation solutions with Raymond Handling Solutions, an important early step is to calculate cubic movement by SKU to determine the proper storage medium. With this type of analysis, one looks at the cubic size of a SKU or item and compares that with sales velocity to come up with a metric for cubic movement over time.

Generally, very fast moving products should be picked from pallet rack, while many medium or slower moving SKUs can be stored and picked from a VLM or carousel with high efficiency and throughput. Even relatively fast moving items, however, could be suited for a carousel or VLM, especially if multiple units are combined to work in concert.

To gain more capacity, a feasible option for many companies is to maximize existing warehouse space by doing a better job of utilizing overhead vertical space.

Once cubic movement velocity is known, and knowing that it's usually desirable to keep two to three weeks of supply in a storage medium, the physical size of a forward pick location can be calculated, says O'Connor. While such assessment involves a bit of effort, it lays the groundwork for choosing the right storage medium and sizing the solution. "Customers are looking for assistance from vendors in being able to truly analyze the application need," O'Connor explains.

According to Doug Card, Kardex Remstar's director of systems and special applications, proper upfront attention to inventory patterns is necessary, both in terms of choosing the right automated storage and retrieval system, but also on how to combine the system with overall order and material flow.

"The key is to take a good upfront

look at inventory patterns and profiles to really understand which SKUs or parts should go in which type of machine, and which items should go into other systems such as flow rack or pallet rack for the really fast movers," says Card. "Another key upfront consideration is slotting the system properly so that you keep the right quantities on hand for each SKU in the system and have the correct mix of picking to replenishment activity."

In addition to sizing analysis, potential users should also consider ergonomic factors, such as using VLMs and vertical carousels as a way to deliver items to pickers at elbow height so that there isn't bending involved, notes Ward. Since dynamic storage and retrieval units are "goods to person" solutions, they also eliminate the ladder and stair climbing involved with multi-level static storage systems. "You can dramatically reduce the risk of injury, which is an important consideration today," says Ward.

Another upfront considerations is to examine how to best divide parts or items on a tray or shelf within a VLM or vertical carousel. While a user company might want to use the same boxes or containers that were in the static system, it make may sense to "detrash" the box and put the items in dividers or totes to speed up picking, notes Ward.

Finally, once the best storage medium is selected, it's necessary to examine the best picking method to be used with the new system. While for relatively low velocity applications, such as tool storage in a manufacturing plant, it might be appropriate to stick with conventional straight order picking. For many warehouse applications with higher throughput needs, batch picking is often the best method.

Kardex Remstar's partners work closely with clients to implement batch picking when and where appropriate, including assisting in integration to host warehouse management systems (WMS) or enterprise resources planning (ERP) systems. Partners can also identify

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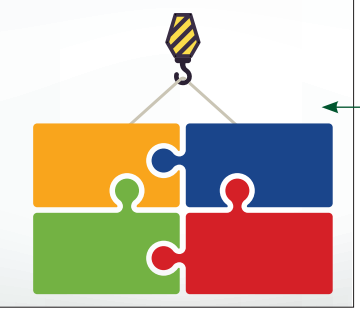
While each facility will differ in terms of what type of systems make sense, VLMs and carousels are a proven and relatively lower cost way to maximize storage and help productivity.



opportunities to pair multiple VLMs or carousels to support higher throughput, and how to best configure pick windows, batching stations, and pick-to-light and put-to-light displays on the units.

Intelligent picking

Under batch picking, items from different orders are batched together and delivered to a batching station in as few movements as possible. A batch pick might involve 10 items being picked from one location on one tray, but the operator would be turning around and distributing three items into one customer order container, three items into another order, and four items into a third order.

Light panels on the equipment clearly direct the operator at the batching station as to how many items to put into each order, so the execution of the batch pick is kept simple for operators.

The whole idea with batch picking is to get goods for multiple orders out of the machine as quickly as possible, with as little movement as possible. Batch picking works because of the intelligence and rules available in software such as Power Pick Global.

While it's possible to implement batch picking by having the batches created by a host system, and then sent down to Power Pick Global for execution, Kardex Remstar's software is fully capable of creating batches and managing the rules for batch picking, and it is quite flexible and easy to use, says Card.

For example, explains Card, the software can automatically create batches based on rules—a supervisor can create batches, or the operator can create the batches. Typically, rules for batches seek out some commonality between order lines, such as different orders for the same SKU, or priority codes. For example, a system's rules can be configured so that orders with "priority one" codes are batched and picked first.

Other capabilities of the Kardex Remstar software, adds Card, include its ability to manage inventory that sits outside a VLM or carousel, and its ability to coordinate multiple carousels or VLMs to feed one pick location.

"The software is going to maximize the throughput of orders through the equipment, and it can also drive multiple units at the same time, which is going to really reduce operator dwell time and pick time," says Card.

Software training does take a bit longer for supervisors or other employees who will be the systems administer handling duties such as setting up new SKUs in the system. Training for operators is more streamlined, says Card, and mainly involves how to use the system to pick parts and run reports. Besides, says Card, users are never far from help, since Kardex Remstar and its partners offer phone support, Web-based training, and other software support services as the support contract for a system.

Servicing the solution

While decades of manufacturing experience have made dynamic storage and retrieval systems highly reliable, they do need regular maintenance, such as lubricating certain parts, visual inspection, or checking belt tension on a VLM.

How often these onsite visits occur depends on how much the equipment is used. For a system in a DC that operates 24/7, there might be quarterly onsite visits, but only twice a year for many other systems.

Support services also include technical assistance with software questions, or help in reconfiguring a system as the user's inventory mix changes, or when seasonal selling patterns make a different set of SKUs the faster movers. With experienced partners close by, help with such questions is only a phone call away, or an expert can be sent on site to provide training or other help, such as answering questions about slotting.

"Slotting is very much a journey, not a destination," says Rodriguez. "With some applications, slotting changes frequently because the business is constantly changing. We can help them with that journey."

The role of partners in providing a solution comes down to helping users pinpoint what the application needs are, and discover the full range of capabilities of systems such as VLMs and carousels, says Ward. The solution, ultimately, is not the equipment itself, but how to best apply it to challenges such as space, picker productivity, safety, or leveraging software to ensure that all overnight orders get out on time.

As Ward sums things up: "We help them discover the full capabilities of these systems, and figure out how to best use those capabilities to benefit their operations."

—Roberto Michel is a Contributing Editor to Modern Materials Handling

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What's in store for e-commerce operations

As inventory visibility advances the art of omni-channel fulfillment, retail stores and distribution centers are driven to develop new skill sets

By **Josh Bond**, Associate Editor

Depending on a business's market, size and geography, the concept of omni-channel fulfillment can mean any number of things. However you slice it, the idea of enabling consumers to buy anything, anywhere, at any time is daunting, particularly when you provide choices about where and how they'd like to receive their purchases.

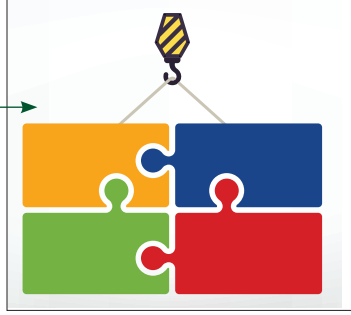
As the linear supply chain transitions into a supply web, fulfillment functions can now be found in distribution centers, stores and even manufacturing facilities. The blending of best practices from each world has created a new battleground for competitive advantages.

As a result, the store's role in omni-channel retail fulfillment is undergoing rapid change. The notion that e-commerce will soon make brick-and-mortar stores obsolete has largely been debunked, but businesses have had varying levels of success turning their retail footprint into a strategic advantage. Many have borrowed technologies and processes from warehousing and distribution operations, and some have seen inventory and fulfillment systems fully integrated with those inside the four walls. But according to Kim Baudry, market development director for Dematic, few have achieved the ultimate vision of omni-channel customer service.

"Walk into the store of someone who says they embrace omni-channel," Baudry suggests. "Ask an associate if you can get a product shipped from another store to your home if it is not available on the shelf. At best, they might be able to look it up online and ship it from the warehouse."

Just as distribution operations are compelled to overcome a pallet-based legacy to deliver smaller and more complex orders, retail stores and back rooms have their own set of inherited limitations. Substantial change is required in both places, and the businesses leading the way have learned that the DC and store need to be on the same page if it's going to work.

"Two years ago people thought, 'we're going to get by,' even though everything was indicating they would need to develop 'from anywhere, to anywhere' capabilities," Baudry says. "Now it's more serious, and many are realizing they have to do it."



Filling the wishes of store and DC

The development of in-store fulfillment has taken multiple paths, says Bryan Jensen, vice president at St. Onge, an engineering and logistics consulting firm. He identifies three of the more prominent concepts, beginning with the idea that store inventory can be used to support demand for "tail" SKUs. These SKUs include odd sizes, last season's colors, and other things that are still in stores but not in the DC.

"The question is how to give an e-commerce customer access to an odd product at a store in, say, Manhattan," Jensen explains. "The old strategy was to collect the items, ship them back to the DC and resend them to the stores where they will actually sell. This costs enormous amounts of money. But if I make the item available on the Internet, I can satisfy customer demand in Florida."

Shipping from a store can also soften the impact of single-line, direct-to-consumer orders on distribution operations accustomed to larger orders bound for stores. Chris Arnold, vice president of operations and solutions development for Intelligrated, is careful not to overstate the volume likely to ship from stores. "But even 100 orders across a network of stores is a big number for some retailers," he says. "It can serve as a sort of pressure valve for peak times in the DC."

Coordination between the DC and store might also take the form of store- or aisle-ready shipments from the DC, which could include items bound for in-store pickup or ship-from-store e-commerce orders. "Depending on how you batch, you can get some good efficiencies by picking to a tote container that clearly identifies an e-commerce order for a store associate," Arnold says. "A DC picker can then fill a larger order made up of several single-line orders, and it will feel just like a standard store replenishment order."

This leads into Jensen's second observation, which involves the desire to position inventory as close as possible to the customer. The traditional "push" model is characterized by DCs sending inventory in bulk to stores, who then deal with managing and selling it. The omni-channel approach suggests a "pull" model, which would instead ship only the inventory most needed at each store.

The distribution of order fulfillment functions across DCs and retail locations can alleviate e-commerce pressures at the DC—or make them worse.

Visibility and centralization of inventory from production to shelf is essential for effective omni-channel execution.

Bruce Stubbs, director of industry marketing for Honeywell Scanning and Mobility, says these models are not necessarily at odds with one another. "The goal is not to overthrow push with pull," he says. "We're not going to manufacture and ship an item in the same day just because a consumer demands it. But if the DC knows the true demand from a store, it can actually help preserve a push approach at the DC based on the reality of inventory."

Instead of scrambling to react to stockouts or overwhelming a store with excess inventory, a partnership between the store and DC can result in just-in-time allocation. Jensen says some have overcome the challenge of travel time between the two by establishing hub stores. If 100,000 or more SKUs are available in the DC, perhaps only 30,000 are available in each store. But a hub store will have certain quantities of nearly all SKUs. A form of this has been around for some time, Jensen says, but having a hub store handle store replenishment and direct-to-consumer fulfillment can alleviate omni-channel pressures on the store and the DC.

Keith Phillips, president and CEO of Voxware, says this satellite DC might serve as an enhanced back room for a single store or provide three or four deliveries per day to each store within a certain radius. Smaller trucks on smaller routes might ferry items to the back room of a store, which in turn might also resemble a miniature DC. This translates into having somewhere between an eight- and 12-hour inventory supply for that store and customer pickup for online orders, he says. But it's not as simple as trucks whizzing back and forth four times a day. Most back rooms have been specifically designed to support just that one store.

"Retailers have been very good at that for decades," Phillips says. "But now the same space has to supply this store, that store and direct-to-consumer. And, you can't just make an assumption that you will sell the same number or type of items in the store as you used to before e-commerce shoppers entered the mix."

Bring the back room to the forefront

A store's back room is not typically known for its rigid discipline and organization. The square footage can be very small and as items are received, they are rarely validated like they would be in a warehouse. An item might be in stock, but associates can't know where it could be. This causes problems for customers in store and online.

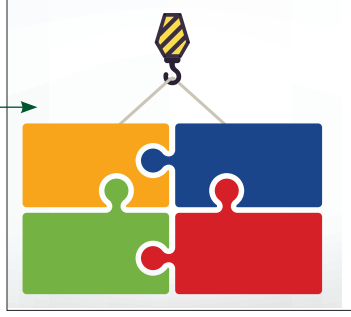
Jensen says a back room does not need to be loaded with picking inventory, but what inventory is there should be pickable. Solutions like RF and voice can boost visibility while also supporting processes for packaging and labeling. In many cases, Jensen says the pack stations in a back room could be a carbon copy of those in the DC.

The store's back room will benefit from any improvements in labels, packaging, bar coding and tracking tools already coming from the DC. Still, many have yet to deploy RF guns, so the idea of leapfrogging an entire generation of data capture technology to adopt voice and real-time capabilities for e-commerce can seem intimidating. Nevertheless, it's a challenge many retailers are eager to tackle.

"There is executive management interest to know what is in the back room," Dematic's Baudry says. "They know it will impact the DC, so it's a natural extension to break down the silos, and we're seeing more buy-in from COOs and CFOs to unify inventory."

That said, the inventory accuracy challenge extends beyond the back room: Imagine if consumers were allowed to wander around inside a DC picking whatever they wanted. Items on the retail floor are constantly in flux, which can complicate efforts to make that inventory available online. A sale is a sale, but a central question for ship-from-store fulfillment is how to simultaneously manage the experience of the in-store and online consumer.

Arnold offers the example of a retailer who went to great lengths to camouflage the process of picking from shelves to satisfy e-commerce orders. "These 'secret shoppers' were associates who looked like any other customer," he recalls. "They picked items to an ordinary



shopping cart and brought them to the back room to validate, consolidate, pack and ship."

As the methodologies of the back room become more similar to those in the DC, Arnold says he has even seen some rudimentary sortation technologies developed. The result is a kind of "outsourcing" of fulfillment functions. "Because you have solutions in the back room to pick, pack and ship, the DC doesn't need to do it for every item," he says. "The DC can pick for multiple stores, send a tote to a store for sortation, and the burden of processing them for either e-commerce or pickup at other store locations has been removed from the DC."

Distributing order management

"From anywhere, to anywhere" is heavily dependent on information technology systems. Traceability is key, as the movement of every product is collected in as close to real time as possible. Stubbs emphasizes the importance of capturing the handoffs and chain of custody between suppliers and the DC, the DC and the store, the store and the truck, and the truck to the customer. "This will remain a very software-driven exercise," he says. "Research suggests about 23% of businesses in western Europe and 27% in the United States are still using paper in some major processes. As we look at technologies to drive these processes faster and more accurately, paper will not even be an option going forward."

Various "lite" versions of warehouse management system (WMS) might be used to manage the mini-DCs of the back room, he says. It can be as simple as subtracting inventory from the WMS as recorded from point of sale (POS) systems and adding what's received in the back room. The store's "lite" WMS might also relay the information to the DC to inform inventory upstream.

To support true distributed order management (DOM), systems must work together at a much higher level, looking across all platforms and all orders to determine the best place to direct an order for fulfillment. Chuck Fuerst, director of product strategy for HighJump Software, says this challenges a lot of store systems that were not necessarily designed for that sort of connectivity. Although it's possible for the store to leverage a subset of the functionality of a warehouse's WMS, Fuerst says it is more common to see a separate instance of a WMS in each place—even if the solution is from the same supplier.

"Early on, you need to establish goals and a focus," Fuerst says. "Whether you are solely focused on cost to serve or never losing a sale, you will make different decisions. If the e-commerce engine is a priority, you might emphasize those orders as opposed to the storefront and accept lack of inventory on the shelf."

In any case, Jensen says that no one should make a habit of transferring inventory between fulfillment locations. "Basing store deliveries on POS data and ensuring replenishment rises to meet that is obviously better than loading up an eastern location with something that doesn't end up selling and needs to move west," he says. "The cost of inventory is not a cost; the cost is in excess inventory. Once you understand the penalty of excess inventory, that's where you can use that money differently by investing in solutions to move and position inventory economically."

Fuerst estimates a 20% savings in inventory costs is not unreasonable and will prevent product relocation or markdowns. The e-commerce factor might also boost sales if a two-item order can be shipped in two parcels from separate locations, but a customer should be fully informed of what's happening. Even if it's cheap and on-time, if the customer doesn't expect two packages it could impact their experience, Fuerst says.

"The most important thing is to say what you will do and do what you say," Fuerst adds. "It's an exciting space to be in, and a fairly significant trend. It's been a while since I have seen something drive so much change in this industry, and we're still on the front end of it. I don't think anybody feels they have it figured out." ☐

The back room of an omni-channel retail store might deploy pick, pack and ship solutions identical to those in the warehouse.

The changing world of industrial distribution

As customer expectations parallel those in retail, industrial distributors are breaking out of traditional solutions to meet the e-commerce challenge.

By **Josh Bond**, Associate Editor

Both industrial and retail distributors can check the same number of boxes on the list of pressing concerns: increased consumer expectations, reduced cycle times, SKU proliferation, e-commerce, labor availability and, naturally, Amazon. Although a few companies are successfully meeting these challenges, it could be argued that the industrial distribution segment as a whole has lagged somewhat behind retail.

Having tracked the industry's efforts to catch up, the experts Modern talked to for this article recommend a phased approach to methods engineering, whether through low-cost tweaks or investments in automation. Companies with the best chance of success, experts say, will rely on actual rather than ideal capital budgets and not compromise strengths or differentiators. They will also abandon assumptions, since industrial distribution's traditional storage, picking and packaging methodologies break down in the omni-channel ecosystem.

"At the start of a project, we once looked at historical data about what the client had been doing, identifying growth periods, volumes and order profiles," says Ross Halket,

As the Pareto curve breaks down, facilities must be prepared to manage a long trail of slow-moving SKUs.

executive director of ASD sales for Schaefer Systems International (SSI). "E-commerce has changed all of that. There is not a way to historically look at this."

Because of SKU proliferation, the Pareto curve, which suggests 80% of sales will come from 20% of SKUs, doesn't apply the way it used to. Some industrial distributors have seen five-fold increases in SKU counts, which has created a long tail of C-movers and D-movers that challenge traditional practices like discrete order picking and dedicated single-SKU storage locations.

"These pretty well-constructed rules of thumb that had guided the industry for 50 years are now out the window," says Greg Conner, regional director for Bastian Solutions. "One of the biggest issues is companies that don't understand what e-fulfillment is, that it's not the same as classic industrial distribution. And as e-fulfillment increases, traditional industrial distribution channels are decreasing. It's not enough to just install an e-commerce system; you need a consolidation strategy for the other side of the business."

Starting small, finishing strong

Industrial distribution facilities are commonly designed around homogeneous storage or picking systems. As the need to hold more SKUs in pallet, case and each quantities increases, facilities have evolved distinct work zones with a variety of technologies and processes.

"Fifteen years ago, the most common answer was to put in a full case pick module, give an operator a sheet of paper, direct the operator to a location, slap a sticker on a box, sort it, palletize it and ship it," Conner says. "That type of solution is now not efficient for the number of picks needed."

Early on in the e-commerce revolution, Halket adds, many thought e-commerce orders would largely consist of one line and one piece each. Orders now tend to be multi-line and multi-piece as customer loyalty transitions to the e-commerce channel. Mixed with SKU growth, order profiles need responsive picking processes. In fact, those considering a move from discrete or batch order picking to dynamic waves might also prepare to shift back to discrete methods on a daily basis.

"In the face of aggressive cutoff times, dynamic waves allow more morning batches to get to the floor efficiently, then later in the day you might switch back to discrete picking to be sure each order makes it out the door," says Jason Gryszkowiec, director at St Onge. To ensure efficient fulfillment, Gryszkowiec suggests a consolidation approach, where separate processes feed a sorting and packaging area. "As you grow, you can start to tailor the picking processes to specific SKU subsets. Some might be suited to pick-to-light, others might benefit from paper/RF batch picking to a cart. But you don't have to design five different concepts in a consolidation system overnight."

Many large-SKU industrial distribution operations are implementing a consolidation approach with sophisticated modular systems, which Gryszkowiec says does not necessarily mean expensive or fancy technology. But where discrete picking tends to create an in-line flow, the consolidation concept is more modular, Gryszkowiec says. They can be upgraded in step with growth while helping to build justifications for technology investment along the way.

Targeting picker productivity

Goods-to-person (G2P) solutions like carousels and automated storage and retrieval systems (AS/RS) are among the most effective technologies for addressing the e-commerce challenge. By compressing pick faces into dense storage, automated solutions reduce the time pickers spend walking. By leaning on automation, industrial distributors can distance themselves from labor-related

New customer expectations demand increased visibility into material movement throughout a facility.

costs including safety, accuracy and seasonal staffing levels.

"If you handle pallets, cases and eaches and have more than 10 people, you're a fit for G2P," says Doug Robertson, founder of AS/R Systems. Robertson says some who pick small parts have been sending man-up turret trucks into pallet storage, but it just doesn't work. "That's all they knew. They had no sophisticated sequencing and orders were spread out all over. If you're driving around, you're only going to get maybe 13.5 items per hour. We saw one carousel application replace 22 people and the 22 forklifts they drove."

Bastian's Conner says a key driver for G2P solutions is operator efficiency amid unpredictable order volume. From a warehousing standpoint, Conner says clients used to be able to do predictive analysis. They figured on average a certain branch location would sell 20 units in a certain time frame, so they would bundle the items and send them to the store in question. "Now, they're sending one item directly to one customer and 19 others to 19 of his friends," Conner says. "Each picking is going up immensely, and staffing can quickly balloon when you try to get it all done with the same old pick module."

Conner says two of the most common automated piece-picking solutions retrieve totes from dense storage using a series of robotic cranes or shuttles. Because of their ability to scale while keeping operators as productive as possible, Conner says G2P systems can keep staffing levels consistent even through seasonal spikes in business—not to mention the ebb and flow of a single day's orders when geared toward rapid fulfillment and delivery schedules.

Still, a fulfillment engine designed solely around G2P is rarely the answer. Halket says any highly automated G2P system does not have a plan B if it goes down, such as operators climbing into the shuttle area to retrieve items. Carousels are a bit easier to work with when down, but redundancy and readily available inventory are essential to meeting stringent consumer demands across multiple channels. The best way to orchestrate multiple technologies and dynamic responses is with the right software.

The backbone of the back end

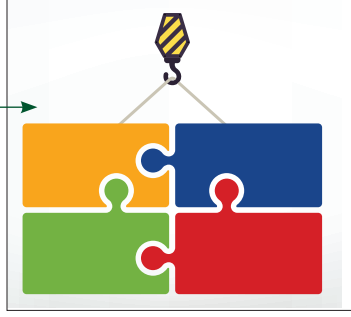
As the brains of an operation, software is often startlingly mismatched with the objectives of a business. Just as with rigid storage or picking systems, monolithic software can give the illusion of capability right up until changes in business reveal its crippling flaws.

Accuracy rates once considered acceptable in industrial distribution have been replaced with a goal of 100%.

"The brick wall starts to manifest itself with not being able to achieve throughput or handle order complexity," says Chuck Fuerst, director of product strategy for HighJump. "More small orders with more lines per orders are one thing, but now returns are becoming a bigger issue for industrial distributors. Their customers expect them to have an online presence and want to order by Web, phone or e-mail with visibility into order updates, confirmations and tracking tools."

Fuerst says clients are looking for ways to react to demand faster but not necessarily carry more inventory than needed, which used to be a best practice. "If returns are increasing, those can become available inventory," he says. "Did you put an e-commerce order on backorder when you had the inventory in another party of facility but didn't have visibility into that?"

The challenge for industrial distributors, according to Helgi Thor Leja, industrial dis-



tribution industry leader with Fortna, is how to not only react but also lead the way. Leja suggests that establishing distinct definitions for multi-channel and omni-channel capabilities will help operations navigate these new trends. Multi-channel is literally the service of multiple channels, something Leja says probably every distributor in the country is doing in some way. If retail stores and Web stores are distinct customer experiences, the DC serving them both has multi-channel capabilities.

Omni-channel, however, refers to the overall business approach and how best to serve each channel seamlessly. Orders, pickups, deliveries, returns and packaging should appear virtually identical to the customer if the seller has omni-channel capabilities. "For example, inventory, however it is stored, fulfilled or shipped, should be presented consistently to the end customer while the business avoids robbing Peter to pay Paul, so to speak," Leja says. "It requires taking a big, shared view of inventory management, integrating core systems, aligning customer communication plans and more. To make it easy for your customer makes it very complex for you."

Software can help manage a variety of processes designed around individual SKU and order segments.

At one client site, the first time Leja visited them it took nine hours for an e-commerce order to make its way to the floor. After the order was received they had to check if the item was in stock, perform a credit check, and make decisions on where to fill and ship based on the allocation of SKUs. Since they didn't have a shared inventory or omni-channel approach, they often needed to buy or transfer SKUs from one channel to another, Leja says. In effect, this eliminated their ability to be competitive with respect to speed. A different client optimized its multi-channel processes into omni-channel strengths, and achieved a 30-minute turnaround from order to ship.

St Onge's Gryszkowiec says simple software adjustments can sometimes have a big impact. In an industrial distribution facility carrying everything from generators to paper clips, disorganized slotting can mushroom into a bigger and bigger problem. "Even in sophisticated operations, they have to get the slotting right," Gryszkowiec says. "Software can help you put bolts with nuts and find SKUs with affinities for one another. This can create huge improvements in productivity."

Robertson encourages software suppliers to join clients in slicing fulfillment methodologies into zones in order to pair the right solution with the right order profiles. "They should set up a network that reviews orders, breaks them out into zones and subdivides," he says. "Perhaps counterintuitively, by splitting up an operation some clients have cut business costs, labor and space by as much as half." □

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